

**REMARKS/ARGUMENTS**

In the Office Action mailed July 22, 2008 in relation to the above application, the Examiner has rejected each of Claims 1 to 18 now of record:

1. Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph,
2. Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. 102(b).
3. Claims 1-18 are rejected under 35 U.S.C. 103(a).
4. Claims 1-18 are rejected on the ground of nonstatutory obviousness-type double patenting

The original application contained claims 1-18. Claims 1-18 were cancelled and new claims 19-36 were added. Applicant submits herewith new Claims 19 to 36, in which independent Claims 19 and 26 replace former independent Claims 1 and 8, and dependent Claims 20 to 25 and 27 to 36 substantially correspond to former dependent Claims 2 to 7 and 9 to 18. The new claims do not introduce new matter and are fully supported by the specification as filed specifically the original claims. Applicant addresses the rejections as they apply to the new claims. Applicant respectfully submits that these claims address and overcome each of the Examiner's objections, for the following reasons, presented in the order raised by the Examiner.

**Rejection of Claims 1 to 18 under 35 USC § 112**

The Examiner has stated that Claims 1 and 8 are indefinite due to lack of clarity and lack of antecedent basis, in relation to the terms "increasing" and "sorbent", and in relation to the nature of the limitation of the "fluidized bed". In new independent Claims 19 and 26, the term "increasing" no longer appears, and the features of the sorbent and the fluidized bed are properly and clearly introduced in the body of the claim, in full conformity with the requirements of 35 USC § 112, thereby overcoming the rejection in relation to these claims.

In relation to the terms "spent sorbent" and "uncaptured carbon dioxide" in Claims 3 and 9, Applicant has redefined the feature of recovery of residual material in new Claims 21 and 27, so that these terms no longer appear in the claims.

In relation to Claims 24, 25, 35 and 36 (replacing former Claims 6, 7, 17 and 18), each of these new claims defines a feature of the fluidized bed. As this term is properly introduced in independent Claims 19 and 26, Applicant submits that the objection is now moot.

As each of the indefiniteness objections to former Claims 1 and 8 has been addressed in new independent Claims 19 and 26, the objection to the remaining dependent claims as being dependent on indefinite claims is now moot.

The Applicant asserts that the claims fully comply with the requirement of 35 U.S.C. § 112, second paragraph. Accordingly, Applicant respectfully requests withdrawn all 35 U.S.C. § 112 rejections.

**Rejection of Claims 1, 2, 4, 5 under 35 USC § 102(b)**

The Examiner has rejected each of these claims as anticipated by Shimizu et al. in “A Twin Fluid-Bed Reactor for Removal of CO<sub>2</sub> from Combustion Processes”. Applicant addresses the rejection as applied to the new claims. Applicant respectfully submits that Shimizu does not identically disclose every element of the claimed invention. See *Corning Glass Works v. Sumitomo Electric*, 9 USPQ 2d 1962, 1965 (Fed. Cir. 1989). A reference that excludes a claimed element, no matter how insubstantial or obvious, is enough to negate anticipation. *Connell v. Sears, Roebuck & Co.*, 220 USPQ 193, 198 (Fed. Cir. 1983).

Applicant respectfully submits that the reference does not disclose each of the features of new independent Claim 19. In particular, the reference does not recognize or in any manner raise the issue of loss of effectiveness of the sorbent after repeated use; much less does the reference indicate or suggest any manner of addressing this issue, in particular by the steps of the method of the present invention.

Shimizu does not identically disclose every element of the claimed invention. The Examiner relies on the indication that the “airstream entering the absorber contains about

15% CO<sub>2</sub>” which is alleged to be “concentrated CO<sub>2</sub>”. However, in paragraph 9 of the Office Action, the Examiner concedes that the reference “does not refer to the carbon dioxide stream entering the absorber as concentrated carbon dioxide”. Applicant submits that the level of CO<sub>2</sub> indicated in the reference cannot be regarded as “concentrated”.

Further, the Examiner has stated that the Shimizu reference discloses a “high purity CO<sub>2</sub>”. Applicant respectfully submits that this statement is not justified, where the reference does not indicate any percentage higher than 15%, and the normal and usual meaning of the term “pure carbon dioxide” would clearly be that it was substantially 100%, i.e. allowing only for the fact that there are no absolutes in the physical world.

It is well known in the art that the percentage noted (15%) corresponds to the usual and expected CO<sub>2</sub> content of flue gas; and merely because this percentage is higher than the usual percentage in atmospheric air, it cannot thereby be regarded as “concentrated” in the context of the present invention. Further, the process described in the reference relates to the general concept of the loop in which the equations (1) and (3) occur; as noted above, the reference does not discuss the reduced carbonation capacity of a sorbent from repeated use, nor the solution provided by the present invention; and the mere presence of the usual flue gas level of CO<sub>2</sub>, albeit elevated over atmospheric air levels, cannot be regarded as teaching the use of highly concentrated levels of CO<sub>2</sub> of at least 85% to reactivate a sorbent and increase its carbonation capacity.

The inventions cited in the reference and the instant inventions are different. Applicant therefore submits that new independent Claim 19, and new Claims 20, 22 and 23, cannot be regarded as anticipated by the Shimizu reference. Applicants respectfully request the Examiner withdraw the rejection under 35 U.S.C. § 102(b).

**Rejection of Claims 1 to 18 under 35 USC § 103(a)**

The Examiner has alleged that each of these claims now on file is obvious from the Shimizu reference, in view of Gupta et al. in “Carbonation-Calcination Cycle” (2002); and Anthony et al. in “Pacification of high calcic residues” (2000). Applicant addresses the rejection as applied to the new claims.

As noted above, the Examiner concedes that the Shimizu reference does not refer to the stream containing carbon dioxide as “concentrated carbon dioxide”, nor teach recovery of spent sorbent and uncaptured carbon dioxide, nor the use of a pressurized fluidized bed combustor or a circulating fluidized bed combustor. The Examiner merely asserts that “it would have been obvious to use a concentrated stream even higher than that taught in Shimizu et al. due to optimization”.

Applicant respectfully submits that this conclusion is not justified and unsupported; “optimization” requires that there be some goal or purpose. Where a prior art reference does not indicate any purpose or relevance whatever for a specific component or feature, particularly one resulting in the normal course of a known process, i.e. the 15% level of CO<sub>2</sub> in flue gas, it cannot be said that any purpose has been identified which would or could be “optimized” by changing the as yet unidentified parameter. KSR International Co. v. Teleflex Inc. (ISR) requires that an Examiner provide “some articulated reasoning with some rationale underpinning to support the legal conclusion of obviousness.” (KSR Opinion at p. 14). An Examiner must “identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does,” (KSR Opinion at p. 15). And, the Examiner must make “explicit” this rationale of “the apparent reason to combine the known elements in the fashion claimed,” including a detailed explanation of “the effects of demands known to the design community or present in the marketplace” and “the background knowledge possessed by a person having ordinary skill in the art.” (KSR Opinion at p. 14). Anything less than such an explicit analysis is not be sufficient to support a *prima facie* case of obviousness.

The reference does not identify any advantage for the 15% level; much less does it teach any manner of utilizing such unidentified advantage for the specific purpose of the invention, i.e. reactivating a sorbent in a manner to enhance its effectiveness, and which could be “optimized” by provision of a higher level of CO<sub>2</sub>. Further, the possible “optimization” of the carbonation to which the Examiner refers as being “the primary function of the reaction” has nothing to do with the reactivation of the sorbent to enhance its effectiveness, i.e. its quantitative capacity to capture carbon dioxide. The level of CO<sub>2</sub> in the airstream of the reference is clearly merely a factor in the provision of sufficient carbon

dioxide to correspond with the oxide.

It therefore cannot be said that the Shimizu reference teaches the subjecting of a sorbent to “concentrated” CO<sub>2</sub>; much less that it teaches the levels of the present invention and for the purposes of the present invention. The Examiner, at page 6 of the Office Action, states that it “would have been obvious to recover any materials in an industrial process” (i.e. any spent sorbent or uncaptured carbon dioxide), basing this statement on the undesirability of releasing excess greenhouse gases. Applicant respectfully submits that it is not justifiable to conclude that because it might be obvious that one would wish to achieve some goal, in this case to reduce or avoid the release of environmental pollutants, therefore it is obvious how to do so and therefore any inventive method which enables this environmental advantage to be achieved must be obvious. The likelihood of recognition of the desirability of a result does not bear on the entirely separate issue of novelty and inventiveness of steps which achieve the result.

Accordingly, Applicant respectfully submits that the new claims, are not obvious over the referenced art and are, therefore, allowable under 35 U.S.C. § 103(a). Applicant respectfully requests that the rejection be withdrawn.

#### **Rejection of Claims 8 to 18 under 35 USC § 103(a)**

In rejecting Claims 8 to 18, the Examiner relies on Gupta (2002) and Anthony (2000). Applicant addresses the rejection as applied to the new claims. Applicant respectfully submits that neither of these references, alone or in combination, and together with the Shimizu reference, teaches the features of the present invention, as claimed in new Claims 26 to 36 (replacing Claims 8 to 18 now on file).

The Examiner has cited the Gupta reference as teaching hydration. However, Applicant submits that the passage on which the Examiner relies is directed to the preparation of a specialty material, i.e. the synthesis of high surface area precipitated calcium carbonate; and that the reference contains no teaching of hydration within a process such as that of the present invention. Similarly, the Anthony reference is directed at controlling the release of sulphur present in ash from fluidized bed combustion, and in

particular at temperatures below 450°C; whereas the carbonation in the method of the invention is performed at temperatures of at least 600°C. None of the three references teaches or suggests the pre-hydration of the sorbent within the context of the present invention, as claimed in new Claim 26. Having regard to the significant differences between the features of the invention as defined in the amended claims submitted herewith, and the teachings of the three cited references, none of Claims 26 to 36 can be regarded as obvious from any of these references.

Accordingly, Applicant respectfully submits that the claims, are not obvious over the referenced art and are, therefore, allowable under 35 U.S.C. § 103(a). Applicant respectfully requests that the rejection of the claims be withdrawn.

**Double patenting rejection**

Applicant herewith submits a terminal disclaimer in respect to co-pending application US 10/577,540 to overcome this rejection.

**Conclusion**

Applicant has added new claims 19-36 that correlate to claims 1-18 and applied the rejections of record to those new claims. In light of the remarks and arguments presented above, Applicants respectfully submit that the claims 19-36 in the Application are in condition for allowance. Favorable consideration and allowance of the pending claims 19-36 are therefore respectfully requested.

If the Examiner has any questions or comments, or if further clarification is required, it is requested that the Examiner contact the undersigned at the telephone number listed below.

Dated: January 22, 2009.

Respectfully submitted,



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